Tol

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,067	02/12/2002	Weyl K. Wang	8378/86334	7460

24628 7590 12/22/2005

WELSH & KATZ, LTD
120 S RIVERSIDE PLAZA
22ND FLOOR
CHICAGO, IL 60606

EXAMINER	
WANG, QUAN ZHEN	
ART UNIT	**PAPER NUMBER**
2633	

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/075,067	WANG ET AL.
	Examiner	Art Unit
	Quan-Zhen Wang	2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17,19, 20, 25-27 and 29-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17,19,20,25-27 and 29-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The amendments to the drawings filed on 10/14/2005 have been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 32-37 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 32 recites "... at least one pre-set pre-emphasis module located at one of the elements, the module establishes a predetermined gain profile, and couples a plurality of optical signals the gain of which is adjusted in accordance with the predetermined profile ...". However, it is not clear what the "gain profile" the module "establishes": the gain of the pre-amplifier or the gain of the span. In addition, it is not clear how "the gain" of the signals "is adjusted in accordance with the predetermined profile".

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6-10, 13, and 15-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Chraplyvy et al. (U.S. Patent US 5,225,922).

Regarding claims 1, 6, Chraplyvy teaches a communication network (fig. 2) comprising: a plurality of optical links (span 20); a plurality of amplifiers (amplifier 22), coupled to the links for amplification of optical signals transmitted through the links wherein the amplifiers have a common gain profile with respect to a predetermined range of wavelengths (column 3, lines 66-67 and column 4, lines 1-3); and a plurality of transmitters (combination of P1-Pn and optical power adjuster 54) of optical signals wherein the members of the plurality emit signals at predetermined, different output parameter values wherein the values are selected in accordance with the gain profile (column 4, lines 16-56).

Regarding claims 2, 8 and 9, the network of Chraplyvy inherently includes transmitter drive circuits coupled to the transmitters, and Chraplyvy further teaches that the drive circuits (which drives the power adjuster portion of the transmitter) drive the transmitters at power levels selected in accordance with the gain profile (column 4, lines 16-56).

Regarding claims 3 and 4, Chraplyvy further teaches that the transmitter output parameter values (power) are selected in accordance with an inverse of the gain profile (column 4, lines 16-56).

Regarding claim 7, Chraplyvy further teaches that at least some of the energy beams are transmitted through up to a pre-determined number of links and wherein the pre-set profile comprises an inverse of the common gain profile raised to an exponent corresponding to the number of links (fig. 3).

Regarding claim 10, Chraplyvy teaches a compensation process for a network comprising: evaluating variations in amplifier gain over a selected range of wavelengths (column 4, lines 16-56); establishing an inverse function of the gain variations (1/Gi); and predetermining an output parameter of an optical transmitter in accordance with a corresponding value of the inverse function on a per wavelength basis (equation A).

Regarding claim 13, Chraplyvy further teaches predetermining an output parameter for each one of a plurality of optical transmitters in accordance with a corresponding value of the inverse function selected from a plurality of corresponding wavelengths (equation A).

Regarding claim 15, Chraplyvy further teaches to provide a plurality of optical transmitters (fig. 2).

Regarding claim 16, the providing step in the process of Chraplyvy inherently comprises providing a plurality of lasers as optical transmitters.

Regarding claim 17, Chraplyvy further teaches to set a power output parameter for each member of the plurality of lasers in accordance with a corresponding value of the inverse function (column 4, lines 16-56).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 5, 11-12, 14, 18-20, 25-27, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chraplyvy et al. (U.S. Patent US 5,225,922) in view of J. L. Zyskind et al. (J. L. Zyskind et al., "Chapter 2 Erbium-doped fiber amplifiers for optical communications" in Optical Fiber Telecommunications IIIB, I. P. Kaminow and T. L. Koch, edited, 1997, Academic Press, pages 13-68) and Chen et al. (U.S. Patent US 6,900,932).

Regarding claim 5, Chraplyvy further teaches that the communication network as in claim 1 which includes at least one optical receiver (fig. 2, detector 52) wherein the receiver inherently exhibits an input range. The system of Chraplyvy differs from the claimed invention in that Chraplyvy does not specifically teach that the signals coupled to the receiver, in accordance with transmitter parameter output values, fall within the input range. However, examiner takes the Official Notice that it would have been obvious for one of ordinary skill in the art at the time when the invention was made to keep the input power couple into an optical receiver within the receiving range of the receiver in order to have the receiver function properly.

Regarding claims 11, 14, the process of Chraplyvy differs from the claimed invention in that Chraplyvy does not explicitly disclose to raise value of the inverse gain function to a predetermined power. However, it is well known in the art that to calculate

total gain of an optical transmission system using the individual gain of the amplifiers used in the system by raising the individual gain of an amplifier used in the system to a predetermined power relating to the number of the spans of the system. For example, Zyskind discloses that the total gain of 13-cascaded amplifiers is the product of the individual gain of each of the 13 amplifiers (fig. 2.8). If identical amplifiers are used, the total gain will be equal to the individual gain of one amplifier to the power of 13. Inverse gain is also used to describe an amplifier or an optical system, for example, Chen discloses that the basic idea behind these devices is to fabricate an optical filter whose transmission function (loss spectrum) versus wavelength is proportional to the inverse of the gain spectrum of the optical amplifier (Column 2, lines 24-30). The total inverse gain of a system can be obtained in the similar method used for calculating the total gain. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to raise value of the inverse gain function to a predetermined power "since scientists and engineers have long known how to raise functions to a power" in order to obtain the information to compensate the gain ripple.

Regarding claim 12, the process of Chraplyvy differs from the claimed invention in that Chraplyvy does not specifically teach to raise values of the inverse function to a power selected from a class which includes the values 2-10. However, it is a common knowledge in the art that the accumulated gain is proportional to the product of the effective span-gains in the system. However, Zyskind discloses that the total gain of 13 amplifiers is the product of the individual gain of each of the 13 amplifiers (fig. 2.8), and Chen discloses that the basic idea behind these devices is to fabricate an optical filter

whose transmission function (loss spectrum) versus wavelength is proportional to the inverse of the gain spectrum of the optical amplifier (Column 2, lines 24-30). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to raise values of the inverse function to a power related to the number of spans in the system, includes the values 2-10, in order to obtain the accumulated values of gain ripple of the system.

Regarding claim 18, Chraplyvy further teaches to include dynamically altering laser power settings in accordance with changing network parameters (column 4, lines 16-56; and claim 6).

Regarding claims 19 and 27, the process of Chraplyvy differs from the claimed invention in that Chraplyvy does not specifically teach to provide pre-set laser modules for installation in a network where the number of optical spans (S) between a module and a respective receiver is not larger than a predetermined exponent. However, Zyskind discloses that the total gain of 13 amplifiers is the product of the individual gain of each of the 13 amplifiers (fig. 2.8), and Chen discloses that the basic idea behind these devices is to fabricate an optical filter whose transmission function (loss spectrum) versus wavelength is proportional to the inverse of the gain spectrum of the optical amplifier (Column 2, lines 24-30). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide pre-set laser modules for installation in a network where the number of optical spans between a module and a respective receiver is not larger than the exponent.

Regarding claim 20, the process of Chraplyvy differs from the claimed invention in that Chraplyvy does not specifically teach that the laser modules each have substantially the same power output profile. However, it would have been an obvious matter of design choice to have the laser modules each having substantially the same power output profile, since applicant has not disclosed that having the laser modules each having substantially the same power output profile solves any stated problem or is for any particular purpose to have the laser modules each having substantially the same power output profile.

Regarding claim 25, Chraplyvy teaches an optical network (fig. 2) comprising: a plurality of optical links (span 20); a plurality of amplifiers (amplifier 22) coupled to respective links wherein at least some of the amplifiers exhibit common gain profiles (column 3, lines 66-67 and column 4, lines 1-3); a plurality of optical transmitters (combination of P1-Pn and optical power adjuster 54) coupled to an input of a selected link; and pre-emphasis adjustment circuitry (which drives the power adjuster portion of the transmitter; column 4, lines 16-56) coupled to the members of the plurality of transmitters. The system of Chraplyvy differs from the claimed invention in that Chraplyvy does not specifically teach that each transmitter's output power is set in accordance with an inverse of the gain profile raised to a predetermined exponent. However, Zyskind discloses that the total gain of 13 amplifiers is the product of the individual gain of each of the 13 amplifiers (fig. 2.8), and Chen discloses that the basic idea behind these devices is to fabricate an optical filter whose transmission function (loss spectrum) versus wavelength is proportional to the inverse of the gain spectrum of

the optical amplifier (Column 2, lines 24-30). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to raise value of the inverse gain function to a predetermined power and set each transmitter's output power in accordance with an inverse of the gain profile raised to a predetermined exponent in order to compensation the accumulated gain ripple of the system.

Regarding claim 26, Chraplyvy further teaches that the pre-emphasis circuitry sets each transmitter's output power in accordance with the inverse gain profile (column 4, lines 16-56; column 7, lines 8-60).

Regarding claim 29, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to select a receiver having a proper sensitivity range, including on the order of 2S dB, for a particular network to meet the particular requirement for the network.

5. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gilliland et al. (U.S. Patent US 6,108,114).

Regarding claim 30, Gilliland teaches an optical transmitter (fig. 2), comprising an optical emitter and circuitry coupled to the emitter for generating controlled signal (column 5, lines 51-55), the circuitry can adjust an output of the emitters in accordance with a control signal, including an inverse of a composite amplifier gain profile. The system of Gilliland differs from the claimed invention in that Gilliland does not specifically teach a transmitter nodule comprising a plurality of optical emitters. However, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to build a transmitter nodule comprising a plurality of optical emitters and circuitry coupled to the transmitters for adjusting an output parameter of the transmitter using the optical transmitter taught by Gilliland, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.*

6. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chraplyvy et al. (U.S. Patent US 5,225,922) in view of Goodwin et al (U.S. Patent US 6,701,089 B1).

Regarding claim 31, Chraplyvy teaches a pre-emphasis method comprising: establishing a gain profile across a range of wavelength for at least one multi-channel light path (fig. 3); setting pre-establishing transmitter output power in accordance with the gain profile, and inherently limiting the number of cascaded light paths to the predetermined maximum number. Chraplyvy differs from the claimed invention in that Chraplyvy does not specifically disclose establishing the widest acceptable receiver input power variation and determining a maximum number of allowable cascaded light paths in response thereto. However, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to establish the widest acceptable receiver input power variation and determine a maximum number of allowable cascaded light paths in response thereto in order to meet the bit-error-rate requirement for a particular network system. Chraplyvy further differs from the claimed invention in that Chraplyvy does not specifically disclose forming an inverse of the gain

profile. However, it is well known in the art to form an inverse profile from a gain profile. For example Goodwin teaches to from an inverse of a gain profile (fig.2). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to form an inverse profile from a gain profile, as it is taught by Goodwin, in order to design compensation for the gain ripple. Chraplyvy and Goodwin further differs from the claimed invention in that Chraplyvy and Goodwin do not specifically teach to raise the inverse of the gain profile to an exponent which corresponds to the maximum allowable number of light paths to form a processed inverse profile. However, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to raise the inverse of the gain profile to an exponent which corresponds to the maximum allowable number of light paths to form a processed inverse profile is an obvious process since scientist and engineers have long known how to raise functions to exponents and it is a common knowledge in the art that the accumulated gain ripple directly relates to the number of spans in the system.

7. Claim 32-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sundelin (U.S. Patent US 6,091,869) in view of Wilner et al. (U.S. Patent US 6,341,021B1).

Regarding claim 32, as it is understood in view of the above 112 problems, Sundelin discloses an optical system comprising: a plurality of communications links (fig. 1, cable); a plurality of add/drop elements (fig. 1, add/drop nodes) between various members of the plurality of links, each of the elements (fig. 3) including a pre-amplifier

(fig. 3, pre-amp 19), the pre-amplifier inherently having a common predetermined input range. The system of Sundelin differs from the claimed invention in that Sundelin does not specifically teach that at least one pre-set pre-emphasis module located at one of the elements, the module establishes a predetermined gain profile, and couples a plurality of optical signals the gain of which is adjusted in accordance with the predetermined profile, to an input of one of the links associated with the one element, the module being usable to limit incoming optical signals to the predetermined input range when used with up to a predetermined number of optical links determined by the common input range. However, Sundelin further teaches that the power per channel in the added signal is given approximately the same level as the power of each passing channel by an optical amplifier arranged in the input line to the add coupler from the multiplexer (abstract), and it is well known in the art to use a pre-set pre-emphasis module to control and limit the input signals. For example, Wilner teaches a dynamic pre-emphasis module (dynamic power equalization module) (fig. 1, module 10), used in a WDM system with non-uniform amplifiers, which couples a plurality of gain adjusted optical signals to the system; and it is well known in the art that a dynamic pre-emphasis module can be used as a static pre-emphasis module and pre-set the emphasis values. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate the pre-emphasis module taught by Wilner into the system of Sundelin, and pre-set the emphasis module to limit incoming optical signals to the predetermined input range when used with up to a predetermined number

of optical links determined by the common input range in order to overcome gain non-uniformity and equalize WDM channels to ensure robust network operation.

Regarding claim 33, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to include a plurality of substantially identical pre-emphasis module in the system in order to reduce the cost for spare parts.

Regarding claim 34, Sundelin further teaches that the elements includes at least one output amplifier (fig. 3, amplifier 43 and 45) with the pre-amplifier (fig. 3, amplifiers 19 and 21) having a first common gain profile and the output amplifiers having a second common gain profile (column 3, lines 43-67).

Regarding claims 35, 36, and 37, the modified system of Sundelin and Wilner differs from the claimed invention in that Sundelin and Wilner do not specifically teach that the pre-emphasis modules each incorporate channel based gain characteristics in accordance with an inverse of at least the common gain profile or the inverse of both of the common gain profile or the gain profiles raised to the predetermined number of links. However, Wilner further teaches that the pre-emphasis module is used to equalize the channels in the system, including gain non-uniformity. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to configure the pre-emphasis modules incorporate channel based gain characteristics in accordance with an inverse of at least the common gain profile the inverse of both of the common gain profile or the gain profiles raised to the predetermined number of links in order to compensate the gain non-uniformity.

Response to Arguments

8. Applicant's arguments on objections under U.S.C.112 filed 10/14/2005 have been fully considered but they are not persuasive.

Applicant argues that the claimed "systems and methods which embody the present invention define feed forward structures and methods which are based on predetermining characteristics of system amplifiers, and, adjusting on a predetermined basis, output power levels of associated laser transmitters. As a result, numerous spans of optical fiber can be coupled together, up to a predetermined number, with the knowledge that the signals received at the final span could be expected to be within the input range of the respective receiver or receivers. Thus, systems and methods in accordance with the present invention make it possible to preset a plurality of gain parameters for respective laser transmitters, for example, when the assemblages are manufactured, without any need for feedback signals for adjusting gain levels for subsequently. Preset modular units can be installed which, with intervening optical fiber, can couple the signals through a maximum number of fiber elements without having to make any further gain determinations or adjustments to ensure that the receiving circuits, at the end of the last fiber element, do pot receive signals which exceed their input range." Applicant further cited a couple of paragraphs from the instant specification to try to distinguish the claimed invention from the prior arts. However, the argued terminologies are not supported by the claims. In addition, the claimed invention, namely, to compensate a wavelength dependent gain profile in an optical communication system by pre-emphasis (setting powers of transmitters) is well known

in the art and is even described in test books. For example, J. L. Zyskind et al. wrote in Chapter 2 of Optical Fiber Telecommunications IIIB (I. Kaminow and T. Koch ed. Academic Press, San Diego, 1977): "... Note that the concatenation of 13 amplifiers has resulted in a net gain shape with considerable curvature over the bandwidth of interest. One way of dealing with this is to use preemphasis. By adjusting the transmitter powers of the individual channels so that the input channel power spectrum is complementary to the gain or SNR spectrum of the amplifier chain, one can equalize either the output power or the SNR at the output of an amplifier chain." Even though the cited text book does not specifically describe the detailed method of implementation, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to find out proper output power values emitters and set the emitters accordingly in order to compensate the gain profile with the knowledge given by the text book.

Applicant further argues "the outstanding rejection of claims 1-4, 6-10, 13 and 15-17 as anticipated by Chraplyvy et al., US Patent 5,225,922 are not in keeping with the standards of anticipation". The Examiner respectfully disagrees with the Applicant. Chraplyvy teaches not only the method of compensating a wavelength dependent gain profile in an optical communication system by setting powers of transmitters with predetermined values, but also the way of getting the different output parameter values for different emitters with a few iterations and feed back signals. Once the values of the output parameter values for different emitters have been obtained by iterations, these values become "predetermined" values for further operation of the system. In addition, Chraplyvy explicitly teaches to predetermine the input power of each individual channel

using the relationship given by Equation (A). Therefore, Chraplyvy clearly anticipate claims 1-4, 6-10, 13 and 15-17 and the rejections of these claims still stand.

Regarding claims 5, 11, 12, 14, 18-20, 25-27 and 29, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it is a common knowledge that the total gain profile of a system of cascaded amplifiers with the same individual gain profile proportional to the individual gain profile to the power of the number of cascaded amplifiers. The total inverse gain profile is proportional to the inverse gain profile of individual amplifier to the power of the number of cascaded amplifiers. Getting an inverse function of a gain from a gain profile and raising the values of the inverse function to a predetermined power are simple mathematically manipulations of numbers which are well known for any artisan in the art. Both Zyskind and Chen are cited to show it is well known in the art to manipulate the gain spectral profile of an optical amplifier in designing an optical transmission system comprising the amplifier. Furthermore, Chraplyvy explicitly teaches to predetermine the input power of each individual channel using the relationship given by Equation (A) that includes the inverse function of the gain variation 1/Gi. Therefore, it would have been obvious for one of

ordinary skill in the art at the time when the invention was made to use the method of Zyskind and Chen to calculate the inverse function of the gain variation 1/Gi in order to determine the input power of each channel. For the reasons above and reasons discussed in regard with claims 1-4, 6-10, 13 and 15-17, the rejections for claims 5, 11, 12, 14, 18-20, 25-27 and 29 still stand.

Regarding claim 30, Gilliland teaches an optical transmitter comprising an optical emitter and circuitry coupled to the emitter for generating controlled signal, the circuitry can adjust an output of the emitters in accordance with a control signal. A person of ordinary skill in the art would configure the control signal in accordance with an inverse of a composite amplifier gain profile in order to compensate a wavelength dependent gain profile in an optical communication system by pre-emphasis (setting powers of transmitters), as it is disclosed, for example, by J. L. Zyskind et al., Chapter 2 of Optical Fiber Telecommunications IIIB (I. Kaminow and T. Koch ed. Academic Press, San Diego, 1977). And it would have been obvious to one having ordinary skill in the art at the time the invention was made to build a transmitter module comprising a plurality of optical emitters and circuitry coupled to the transmitters for adjusting an output parameter of the transmitter using the optical transmitter taught by Gilliland, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art.

Regarding claim 31, as it has been discussed above, Chraplyvy teaches concept and method to compensate a wavelength dependent gain profile in an optical communication system by setting the output powers of the emitters, and Goodwin

teaches to from an inverse of a gain profile (fig.2). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to form an inverse profile from a gain profile, as it is taught by Goodwin, in order to design compensation for the gain ripple. Chraplyvy and Goodwin further differs from the claimed invention in that Chraplyvy and Goodwin do not specifically teach to raise the inverse of the gain profile to an exponent which corresponds to the maximum allowable number of light paths to form a processed inverse profile. However, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to raise the inverse of the gain profile to an exponent which corresponds to the maximum allowable number of light paths to form a processed inverse profile is an obvious process since scientist and engineers have long known how to raise functions to exponents and it is a common knowledge in the art that the accumulated gain ripple directly relates to the number of spans in the system.

Regarding claims 32-37, Applicant argues that because Sundelin states: "The power levels is adapted, so that the individual power levels of the channels to be added are as equal as possible to those of the channels continuing substantially uninterruptedly through the node 7 from one line cable 1, 13 to the opposite one 13,1", then the applicant concludes the "Sundelin et al. thus dynamically adjusts power levels of newly added signals." The Examiner disagrees with the Applicant's conclusion. Sundelin does not disclose that the power levels of the newly added signals are dynamically adjusted through out the whole patent. The fact that the power levels is adapted so that the individual power levels of the channels to be added are as equal as

possible to those of the channels continuing substantially uninterruptedly through the transmission line does not mean that the powers are adjusted dynamically. The power levels can be pre-emphasized using the technique disclosed by Wilner. Because Wilner discloses a dynamic pre-emphasis module, the module can be also used as a static pre-emphasis module and pre-set the power levels in the system of Sundelin to balance the transmitter channels based on the information of the gain profiles. Therefore, the combination of Sundelin and Wilner discloses all the limitations in the claims 32-37 and the rejections of claims 32-37 still stand.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Olshansky (U.S. Patent US 5,276,543) discloses an optical signal equalizer for WDM system

Taga et al. (U.S. Patent US 5,790,289) disclose a WDM system with pre-emphasis techniques.

Shimokawa et al. (U.S. Patent US 6,445,471 B1) disclose an apparatus and method for making transmission characteristics uniform in a WDM system.

DaSilva et al. (U.S. Patent US 6,674,557 B1) disclose a WDM system utilizing pre-emphasis to equalize the received OSNR.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571) 272-3114. The examiner can normally be reached on 9:00 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qzw
12/9/2005

JASON CHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600